



St. Paul's Hospital Millennium Medical College

Graduate Study Program

Uncontrolled Hypertension and Associated Factors among Adult Hypertensive Patients at Selected Public Hospitals in Addis Ababa, Ethiopia, 2025: A Multi-Centered Institution-Based, Cross-Sectional Study

Derese Gizaw, MD, Family Medicine resident

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By: Derese Gizaw, MD, Family Medicine Resident

Advisors: Fufa Hunduma, MD, MPH, PhD candidate, Assistant Professor of Field Epidemiology

: Subah Abderehim, MD, MA, MSPM, Hon. Assistant Professor in Family Medicine

A Thesis Submitted to the Department of Family Medicine, St. Paul's Hospital Millennium Medical College, in Partial Fulfillment of the Requirements for the Specialty in Family Medicine.

Assurance of principal investigator

I the undersigned, accept full responsibility for the scientific and ethical conduct of this research project, as well as for submitting all required progress reports in accordance with the terms and conditions set by the Research Publications Office at the time the grant is awarded. I will provide timely progress updates to my advisors and will seek guidance and approval from my advisors throughout the course of the research.

Name of the student: _____ Signature: _____ Date: _____

Name of the advisor: _____ Signature: _____ Date: _____

Name of the advisor: _____ Signature: _____ Date: _____

Abstract

Background:

Uncontrolled hypertension is a significant global public health issue, where it remains a leading cause of cardiovascular diseases, stroke, and premature death. Various factors have been linked to uncontrolled hypertension.

Objective: The aim of this study was to assess the magnitude of uncontrolled hypertension and associated factors among adult hypertensive patients on follow-up at public hospitals in Addis Ababa, Ethiopia.

Methods: A hospital-based cross-sectional study was conducted among 600 hypertensive patients at selected hospitals from January 1 to January 31, 2025. A systematic random sampling technique was used to select the study participants. Data was collected through face-to-face interviews and reviewing patients' charts. Bivariable and multivariable logistic regression analyses were performed to identify factors associated with uncontrolled hypertension

Result: The prevalence of uncontrolled hypertension among hypertensive patients at public hospitals in Addis Ababa was 58.3% (95% CI = 54.34%, 61.6%). After adjusted analysis, the presence of comorbidity (AOR = 2.38, 95% CI: 1.34, 4.96), being overweight (AOR = 2.52, 95% CI: 1.96, 6.24), non-adherence to anti-hypertensive medication (AOR = 6.31, 95% CI: 3.76, 9.44) and taking three or more anti-hypertensive medications (AOR = 2.21, 95% CI: 1.21, 7.63) were factors associated with uncontrolled hypertension.

Conclusion: This study reveals a high prevalence of uncontrolled hypertension, influenced by factors like medication adherence, comorbidities, overweight status, and taking three or more antihypertensive medications. Healthcare providers should prioritize improving medication adherence, managing comorbidities, and offering personalized interventions, especially for those on multiple medications. Enhanced patient education and better healthcare access are also recommended.

Keyword: Uncontrolled hypertension, antihypertensive medication adherence, comorbidities, overweight, Ethiopia, cardiovascular risk factors

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Abbreviations and Acronyms

ACC:	American College of Cardiology
AHA:	American Heart Association
BMI:	Body Mass Index
BP:	Blood Pressure
CVD:	Cardiovascular Disease
DASH-Q:	Dietary Approaches to Stop Hypertension Questionnaire
DBP:	Diastolic Blood Pressure
ETB:	Ethiopian Birr
GAD-7:	Generalized Anxiety Disorder 7-item
H-SCALE:	Hypertension Self-Care Activity Level Effects
HK-LS:	Hypertension Knowledge-Level Scale
HTN:	Hypertension
LMICs:	Low- and Middle-Income Countries
MD:	Medical Doctor
NCD:	Noncommunicable Disease
OSSS-3:	Oslo Social Support Scale
PHQ-9:	Patient Health Questionnaire-9
PhD:	Doctor of Philosophy
RDDH:	Ras Desta Damtew Hospital
SBP:	Systolic Blood Pressure
SPHMMC:	Saint Paul's Hospital Millennium Medical College
SPSS:	Statistical Package for the Social Sciences
TBGH:	Tirunesh Beijing General Hospital
USD:	United States Dollar
WHO:	World Health Organization
Y12HMC:	Yekatit 12 Hospital Medical Colleg

1. Introduction

1.1. Background of Study

Hypertension (HTN) is a common medical condition characterised by consistently elevated blood pressure in the arteries. It significantly increases the risk of developing cardiovascular diseases, including heart disease, stroke, and kidney failure, as well as other organ damage. Hypertension is clinically defined as having a systolic blood pressure (SBP) of 140 mmHg or greater, or a diastolic blood pressure (DBP) of 90 mmHg or greater, or taking medication for hypertension.¹ For all patients with hypertension without comorbidities, World Health Organization(WHO) recommends a target blood pressure treatment goal of less than 140/90 mmHg. For Patients with Known Cardiovascular Disease (CVD) or those with conditions like high CVD risk, diabetes mellitus, or chronic kidney disease the WHO suggests a target SBP treatment goal of less than 130 mmHg.²The American College of Cardiology (ACC) and American Heart Association (AHA) guidelines recommend even lower thresholds for diagnosis and treatment.³

Uncontrolled hypertension is defined as blood pressure that remains at or above 140/90 mmHg, and this category includes individuals who have not been diagnosed with hypertension, as well as those who are diagnosed but are either not on treatment or whose blood pressure remains uncontrolled despite treatment.² The condition is a significant public health challenge globally, particularly in low- and middle-income countries (LMICs) like Ethiopia, where access to adequate healthcare services and effective hypertension management can be limited.

Globally, hypertension affects approximately 1.28 billion adults aged 30–79 years, with nearly half of them unaware of their condition. About 78% of adults with hypertension live in LMICs. Among adults aged 30–79 years with hypertension, an estimated 54% have been diagnosed with hypertension, 42% are being treated for their hypertension, and 21% have had their hypertension controlled. Treatment coverage tends to be higher in wealthier countries. In low-income countries, only 26% of adults with hypertension were receiving treatment vs 58% in high-income countries. Globally, in 2019, more than half of all cardiovascular deaths were attributable to high systolic blood pressure – including all deaths from hypertensive heart disease, 53% of ischaemic heart disease deaths, and 53% of stroke deaths. In addition,

62% of deaths from chronic kidney disease are attributed to high systolic blood pressure. Across the African continent, hypertension has reached epidemic proportions, with an estimated prevalence of 46% among adults aged 25 and above. However, the control rates are alarmingly low, with only about 7% of diagnosed cases achieving target blood pressure levels. In sub-Saharan Africa, hypertension accounts for 20% to 25% of all adult deaths, reflecting the severe impact of uncontrolled blood pressure in the region.²

In Ethiopia, the burden of hypertension is steadily increasing, particularly in urban areas. According to the 2015 National Noncommunicable Diseases (NCD) STEPS Survey, the national prevalence of hypertension was 16%, with a higher prevalence among urban dwellers (22%) compared to rural populations (13%). The survey also highlighted that hypertension becomes more prevalent with age, increasing from 10.6% in younger adults to 37.6% among older adults. There was no significant difference between men (15.7%) and women (16.5%) or across income levels. Stage 2 hypertension (SBP $\geq$ 160 mmHg and/or DBP $\geq$ 100 mmHg), which is more severe and often associated with greater risks, was found in 4.4% of the population. In terms of regional differences, Addis Ababa had a hypertension prevalence of 22.6%, second only to Gambella (24.6%), while Afar had the lowest prevalence at 8%.⁴ In terms of uncontrolled hypertension, a study conducted at Tikur Anbessa Specialized Hospital in Addis Ababa found that 60.2% of hypertensive patients had uncontrolled blood pressure despite being on treatment.⁵ Another study at Saint Paul's Hospital, Millennium Medical College in Addis Ababa, reported that 52.1% of hypertensive patients had uncontrolled blood pressure, and identified behavioral risk factors such as alcohol consumption, smoking, and high salt intake as strongly associated with uncontrolled hypertension.⁶ Similarly a more recent study in Addis Ababa found that 66.2% of hypertensive patients at public hospitals had uncontrolled hypertension. Factors such as age $\geq$ 60 years, the presence of comorbidities, being overweight, non-adherence to antihypertensive medication, failure to follow a low-salt diet, taking three or more antihypertensive medications, and lack of physical exercise were identified as significant contributors to uncontrolled hypertension.⁷

Numerous risk factors contribute to the development of hypertension, both globally and in Ethiopia. According to the AHA and ACC, well-established risk factors for hypertension include unhealthy lifestyle habits such as excessive sodium intake, physical inactivity, obesity, and high alcohol consumption. Additionally, smoking, poor dietary choices (such as

low fruit and vegetable intake), and high stress levels are major contributors. Non-modifiable risk factors include age, family history, and certain underlying medical conditions like diabetes and chronic kidney disease.⁸ The WHO also underscores the role of environmental and socioeconomic factors, such as urbanization, which increases exposure to risk factors like processed foods and sedentary behavior, contributing to higher rates of hypertension in urban populations globally. The growing prevalence of hypertension and uncontrolled hypertension in LMICs, such as Ethiopia, is also compounded by healthcare system challenges, including limited access to primary care services, lack of regular blood pressure monitoring, and inadequate health education on the importance of medication adherence.²

In the specific Ethiopian context, similar risk factors have been identified. For example, studies conducted at Saint Paul's Hospital, Millennium Medical College, have shown that lifestyle behaviors such as smoking, excessive alcohol consumption, and high salt intake are closely associated with uncontrolled hypertension. Obesity, lack of physical activity, and low health literacy are additional risk factors that exacerbate the problem in Ethiopian urban settings. Poor adherence to anti-hypertensive treatment is also a common issue, with factors such as low health literacy, limited healthcare access, and cultural beliefs contributing to poor hypertension management outcomes. As a result, many patients either remain undiagnosed or fail to achieve controlled blood pressure levels, putting them at higher risk for cardiovascular events.⁵⁻⁶

1.2. Statement of the Problem

Uncontrolled hypertension is a significant global public health issue, particularly in low- and middle-income countries, where it remains a leading cause of cardiovascular diseases, stroke, and premature death. In Ethiopia, 51% of hypertensive patients have uncontrolled blood pressure.⁹

The consequences of uncontrolled hypertension are dire, leading to increased risks of stroke, heart attack, kidney disease, heart failure, and premature death.¹⁰⁻¹¹ In Ethiopia, the rising prevalence of these complications is placing a tremendous burden on the healthcare system, leading to escalating costs, loss of productivity, and a reduction in the quality of life for many.^{12, 13} The Ethiopian government, in response, has developed policies to integrate hypertension management into primary healthcare, with an emphasis on early detection, prevention, and access to medications, in collaboration with global partners like the World

Health Organization (WHO).^{14,15,16} Despite these efforts, challenges such as inadequate healthcare infrastructure, low health literacy, and limited access to medications continue to impede progress.¹⁷

Various factors have been linked to uncontrolled hypertension, including older age, male gender, rural residency, low educational levels, smoking, alcohol consumption, khat chewing, excessive salt intake, and comorbidities like diabetes.^{18,19,20} However, many of these studies have focused on single medical facilities and have not thoroughly examined the effects of other conditions, such as number of medications used, source of medication, number of followup visits, and duration of hypertension were not properly explored.

1.3. Significance of Study

Researching the prevalence of uncontrolled hypertension and its associated factors can inform targeted interventions, guide healthcare policies, and improve patient outcomes, ultimately reducing healthcare costs. This study aims to provide critical insights for developing effective, context-specific healthcare strategies in Ethiopia, benefiting key stakeholders such as healthcare practitioners, local policymakers, and researchers in their efforts to enhance hypertension management and prevention.

2. Literature Review

2.1 Prevalence of Uncontrolled Hypertension

Hypertension represents a global health crisis, affecting approximately 1.4 billion adults worldwide.²¹ The prevalence of hypertension is similar across income-level groups, with rates slightly higher in low-income countries (34%) compared to high-income countries (32%). However, regional variability is significant, ranging from 28% in the WHO Western Pacific Region to 38% in the Eastern Mediterranean Region. Globally, hypertension affects 34% of males and 32% of females, with women under 50 showing lower prevalence than men, while both genders aged 50-79 have equivalent rates (49%). From 1990 to 2019, the global prevalence of hypertension increased marginally from 32% to 33%, despite a decline in high-income countries. While treatment coverage is higher in wealthier nations (58% in high-income vs. 26% in low-income countries), only about 54% of those diagnosed receive treatment, and just 21% have controlled hypertension. Uncontrolled hypertension is prevalent among nearly 30% of undiagnosed individuals and has shown only a slight decline globally from 29% in 2010 to 26% in 2019. Hypertension remains a leading risk factor for mortality, contributing to over 10 million deaths in 2019, particularly affecting those under 70 in LMICs, where high blood pressure accounts for 80% of related fatalities.² Hypertension control in the U.S. adult population has improved over time, with variations based on demographic and socioeconomic factors. From 2009–2012, NHANES data indicated control rates among treated hypertensive adults at 69.5% for men and 68.5% for women, while overall control in adults with hypertension was 49.3% for men and 55.2% for women. Control rates were higher in women (55.3%) than men (38.0%), in whites (41.3%) versus Black (31.1%) and Hispanic (23.6%) men, and in older adults (50.5% in those aged ≥ 60) compared to younger adults (34.4% in those aged 18–39). Socioeconomic status also influenced control, with 43.2% of adults above 400% of the poverty line achieving control compared to 30.2% of those below. Structured BP management programs, especially those with goal-oriented approaches and free medication, have been shown to increase control rates in healthcare settings.³ In Europe, studies show that about 30% to 45% of individuals with hypertension remain uncontrolled.²²

A study published in The BMJ examined the prevalence, awareness, treatment, and control of hypertension in China from 2004 to 2018, using data from six rounds of the China Chronic

Disease and Risk Factor Surveillance survey. Findings revealed that hypertension prevalence initially rose from 20.8% in 2004 to 29.6% in 2010 before decreasing to 24.7% by 2018. Higher prevalence was observed in rural areas, particularly among women with lower education levels. Although rates of awareness (38.3%), treatment (34.6%), and control (12.0%) improved over time, they remained low, with urban areas achieving slightly better control yet rural regions seeing greater improvements in diagnosis and treatment.²³

A 2024 systematic review and meta-analysis done in Sub-Saharan Africa between 2014 and 2023 shows the prevalence of uncontrolled hypertension to be 50.29%, with significant with factors such as older age, extended duration of diagnosis, physical inactivity, khat chewing, and habitual coffee consumption.²⁴

A 2020 systematic review and meta-analysis investigated the prevalence of uncontrolled hypertension in Ethiopia, synthesizing data from 13 institution-based studies conducted between 2014 and 2019. The analysis revealed a pooled prevalence of uncontrolled hypertension of 48, with the highest rates observed in 2016 (63%) and 2015 (59%).²⁵ Another systematic review and meta-analysis conducted in Ethiopia estimated prevalence of uncontrolled HTN to be 51%. Diabetes mellitus was the most significant factor associated with uncontrolled HTN.²⁶ Another study, conducted in 2022, using a cross-sectional method to assess the prevalence and factors associated with uncontrolled hypertension at Saint Paul's Hospital in Addis Ababa. revealed that 52.1% of hypertensive patients experienced uncontrolled hypertension. The odds of uncontrolled hypertension were significantly higher for alcoholics, smokers, and those with high salt intake. Illiterate individuals and the obese had increased prevalence. Conversely, urban residents, individuals who engaged in physical activity, and those who were overweight had lower odds of uncontrolled hypertension.⁶

In a cross-sectional study done at Tikur Anbessa Specialized Hospital 60.2% of patients have uncontrolled blood pressure. The mean age of participants was 55.5 years; 50.9% were male, and 7.6% were active smokers. More than half (56.0%) were overweight or obese, with common comorbidities including diabetes (48.0%), dyslipidemia (50.9%), and chronic kidney disease (56.1%). Key factors associated with poor blood pressure control included advancing age, higher household income, physical inactivity, and chronic kidney disease, while home blood pressure monitoring was linked to improved control.⁵ A hospital-based cross-sectional study conducted in Eastern Ethiopia found that 48% of participants had uncontrolled hypertension. Significant risk factors included being male, age ≥ 55 years, non-

adherence to medication, low diet quality, physical inactivity, and having comorbidities.²⁷ A cross-sectional study conducted at three public hospitals in Addis Ababa found that 66.2% of hypertensive patients had uncontrolled blood pressure. The mean age of participants was 56.3 years, with 52.7% being female. Around 41.9% are normal weight, 39% were overweight and 51.7% have comorbidity. Key factors associated with poor blood pressure control included age ≥ 60 years, the presence of comorbidities, being overweight, non-adherence to antihypertensive medication, failure to follow a low-salt diet, taking three or more antihypertensive medications, and lack of physical exercise.⁷

2.2 Factors associated with Uncontrolled Hypertension

Several factors contribute to the problem of uncontrolled hypertension, encompassing biological, environmental, and behavioral dimensions. The likelihood of uncontrolled hypertension is influenced by various risk factors, including demographic, behavioral, and socioeconomic determinants.²⁸ Age is a significant risk factor, with older adults more likely to experience uncontrolled hypertension due to physiological changes and comorbidities.²⁸ Obesity, characterized by increased body mass index (BMI), is another critical determinant, as excess weight can lead to higher blood pressure levels.²⁸ Sedentary lifestyles and low levels of physical activity are common among hypertensive patients, exacerbating the risk of uncontrolled hypertension.²⁸

The WHO highlights that insufficient physical activity, along with high sodium intake and low consumption of fruits and vegetables, significantly contributes to the development of hypertension.²⁹ A study conducted in Addis Ababa found that dietary habits, particularly high sodium intake, were prevalent among hypertensive patients, which further complicates blood pressure management.³⁰ Social determinants also play a crucial role in hypertension management. Socioeconomic status, education, and healthcare access significantly influence the ability of individuals to manage their hypertension effectively. Research shows that patients from lower-income backgrounds often encounter barriers to accessing regular medical care, which exacerbates the challenges associated with uncontrolled hypertension.^{31,32,33} Furthermore, misconceptions about hypertension and its treatment can lead to underestimating health risks, resulting in poor adherence to treatment regimens. The CDC reports that awareness and education about hypertension are crucial for effective management, as many individuals remain unaware of their condition or its implications.³⁴

While existing research has highlighted the prevalence and risk factors for hypertension in Ethiopia, there remains a significant gap in data specific to uncontrolled hypertension, particularly in urban public hospital settings. Several factors associated with uncontrolled hypertension in previous studies include being male, advanced age, rural residence, low educational level, family history of hypertension, smoking, khat chewing, alcohol consumption, excessive salt consumption, lack of physical activity, poor weight control, and diabetes. Most of these studies were conducted in a single hospital.²⁸ Role of number of medications used, source of medication, number of followup visits, dyslipidemia and duration of hypertension were not properly explored. In addition, those identified factors were inconsistently reported across all studies. This study aims to address that gap by examining the prevalence of uncontrolled hypertension and its associated factors among adult hypertensive patients on follow-up at selected public hospitals in Addis Ababa.

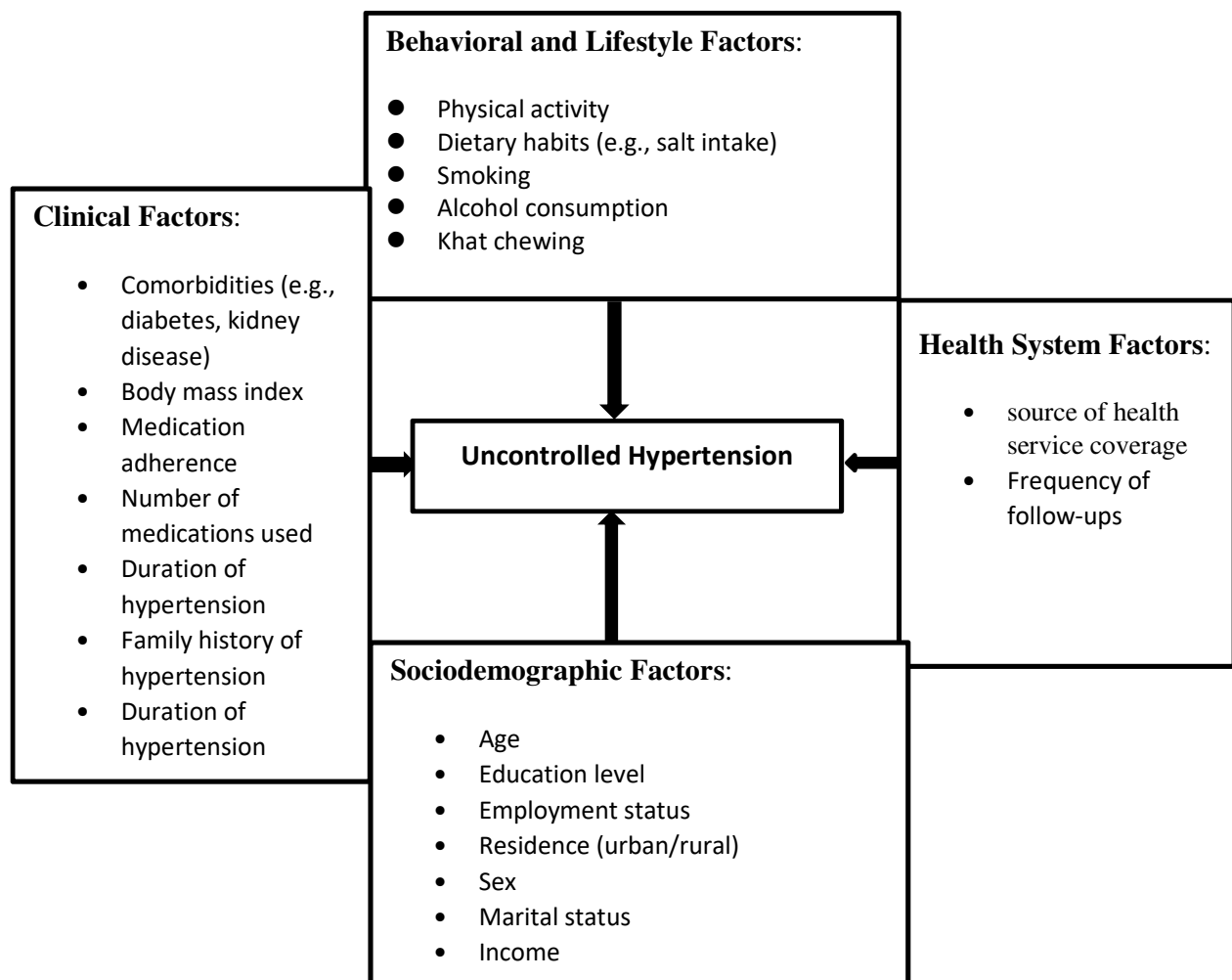


Figure 1. Conceptual framework showing the associated factors with uncontrolled hypertension

3. Objectives of the Study

General Objective:

To assess the prevalence of uncontrolled hypertension and identify associated factors among adult hypertensive patients on follow-up at selected public hospitals in Addis Ababa, Ethiopia, 2025.

Specific Objectives:

- To determine the prevalence of uncontrolled hypertension among adult hypertensive patients on follow-up.
- To identify associated factors with uncontrolled hypertension among adult hypertensive patients.

4.Methods

4.1. Study Setting

The study was conducted in three randomly selected public hospitals in Addis Ababa, which are Tirunesh Beijing General Hospital(TBGH), Ras Desta Damtew Hospital(RDDH), and Yekatit 12 Hospital Medical College(Y12HMC).

RDDH has a total of 166 beds with six inpatient wards and 19 outpatient departments. It provides medical services for an estimated 4 million people.³⁵ Y12HMC serves a vast catchment area with an estimated population of over 5 million. On average, the hospital accommodates between 200 to 250 patients daily through its outpatient department across six units.³⁶ TBGH was named after a famous Ethiopian Olympic gold medallist Tirunesh Dibaba during Beijing Olympics (China) and the Hospital is found in Akaki-Kaliti sub-city, Addis Ababa, Ethiopia. The Hospital serves about 2 million people.³⁷

4.2. Study Design and period

A Multi-Centered Institution Based, Cross-Sectional Study was conducted from January 1 to January 31 , 2025.

4.3. Source and study population

4.3.1. Source population

The source population were all adult hypertensive patients receiving follow-up care at public hospitals in Addis Ababa from January 1 to January 31 , 2025.

4.3.2. Study population

All hypertensive patients who were on treatment and follow up at this three public hospitals (TBGH, RDDH & Y12HMC) from January 1 to January 31 , 2025.

4.3.3. Inclusion criteria

All whose age >18yrs, with a confirmed diagnosis of hypertension and who were on treatment and follow up for at least for 6 months at these three public hospitals (TBGH, RDDH & Y12HMC) during the study period were included.

4.3.4. Exclusion criteria

Individuals with secondary hypertension, those who were pregnant or those who had cognitive impairment were excluded.

4.4. Sample size Determination

A single population proportion formula was used to determine the required sample size for the primary objective. The assumptions used to calculate the sample size is: 95% level of confidence interval ($Z_{\alpha/2} = 1.96$), 5% margin of error. Published data in Ethiopia depicted the prevalence of uncontrolled hypertension to be 51%.²⁷

Where: $n = (Z_{\alpha/2})^2 * p * (1 - p) / d^2$

- n = sample size
- Z = Z-score (1.96 for a 95% confidence level)
- p = estimated proportion of uncontrolled hypertension (based on previous studies, we will use 0.51 for Ethiopia)²⁷
- d = margin of error (0.05)

Plugging in the values, we have:

$$\frac{1.96^2 * 0.51(1-0.51)}{0.05^2} = 384$$

To calculate sample size for the secondary objective we used two population proportion formula.

The formula for calculating the sample size is:

$$n = ((Z_{\alpha/2}) * \sqrt{(P1 * (1 - P1) + P2 * (1 - P2))})^2 / (P1 - P2)^2$$

Where:

- n = sample size per group
- $Z_{\alpha/2}$ = is the Z-score for the desired confidence level
- P_1 and P_2 = are proportions in the two groups

The sample size obtained from the secondary objective was 194 . Since the sample size for the primary objective is larger than the secondary objective we used that; which is 384. And by adding 10% non-response rate the sample size became 422. Then we multiplied the sample size by 1.5 since we used multi staged sampling for the design effect so our final sample size became 633.

4.5. Sampling Procedures

We used a two-stage cluster sampling method for this study. In the first stage, three out of twelve public hospitals in Addis Ababa were randomly selected via a lottery method; these were TBGH, RDDH, and Y12HMC.

In the second stage, We allocated the sample size proportionally across the selected hospitals, based on each hospital's patient load. To estimate this distribution, we calculated the average patient load at each hospital, using data from the past three months. Then Daily sample sizes was proportionally assigned according to each hospital's average number of eligible patients.

After reviewing the monthly patient flow, the average number of patients attending follow-up per month across all hospitals was 1,288: TBGH (500), RDDH (288), and Y12HMC (500). A proportional allocation method was used to distribute the adjusted sample size of 633 across the hospitals: TBGH (246), RDDH (141), and Y12HMC (246). Systematic random sampling was applied within each hospital for patient selection, with patient visits serving as the sampling frame. The first case was chosen by lottery, followed by a sampling interval k of approximately 2 to ensure unbiased selection.

4.6. Data Collection Procedures

The data were collected using an interviewer-administered structured questionnaire through face-to-face interviews adapted from various studies.^{21,38,39} We used the hypertension self-care Activity level effect (H-SCALE) questionnaire.⁴⁰ The H-SCALE was preferred because

it offers a more comprehensive and detailed evaluation of a patient's status, as it includes medication adherence, physical activity, smoking, salt intake, alcohol, and weight management. By combining these different aspects, the H-SCALE paints a more complete picture of a patient's hypertension control as compared to relying solely on blood pressure readings. The questionnaire was designed to gather information regarding socio-demographic variables, patient clinical variables, and behavioral practice related variables. The internal consistency of the H-SCALE questionnaire was tested in studies performed in Eastern Ethiopia and was reported to be acceptable, with good to excellent values. The specific values for each self-care domain were as follows: for medication adherence, 0.94; for a low-salt diet, 0.74; for physical activity adherence, 0.81; for weight management, 0.93; and for alcohol use, 0.92.²⁸

4.7. Study Variables

Dependent Variable: uncontrolled hypertension.

Independent variables:

Socio-demographic variables: age, sex, marital status, educational level, monthly income in Ethiopian Birr, residence status, and work status.

Patient clinical variables: included the presence of comorbidities, current BMI, family history of hypertension, number of antihypertensive medications, duration of hypertension diagnosis, duration of treatment, and type of comorbidity.

Behavioral practice and lifestyle factors: included adherence to antihypertensive medications, adherence to salt restriction, nonadherence to weight management, non-adherence to physical activity, non-adherence to alcohol abstinence, khat chewing, and non-adherence to smoking abstinence.

Health System Factors: frequency of followup, frequency of BP checkup and source of medication.

4.8. Operational Definition

Uncontrolled hypertension was defined as a patient's systolic blood pressure >150 mmHg and/or diastolic blood pressure > 90 mmHg for patients aged > 60 years old or systolic blood pressure > 140 mmHg and/or diastolic blood pressure > 90 mmHg for all other patients

aged < 60 years old who are on treatment, including patients with comorbidities.²⁸ Hypertensive patients were categorized as either uncontrolled or controlled based on whether they met blood pressure targets as defined by the JNC-8 guidelines.

Medical comorbidity: refers to a patient with hypertension who also has one or more other medical disorders. These conditions can be acute or chronic, and they can impact each other, sometimes in complex ways. Some of the comorbidities seen in a patient with hypertension include the following: diabetes mellitus, chronic kidney disease, chronic obstructive pulmonary disease, coronary artery disease, dyslipidemia, sleep apnea, depression and anxiety, peripheral artery disease, atrial fibrillation, heart failure, previous stroke or transient ischemic attack, cognitive dysfunction, aortic valve stenosis.^{41,42,43}

The H-SCALE scoring method used to collect the data included the following variables.⁴¹

Medication adherence: Three items were used to assess the number of days in the preceding week that an individual took blood pressure medication, took it at the same time every day, and took the recommended dosage. Each item constituted 0–7 days as a response. Responses were summed (range 0–21).⁴¹

Adherence to medication: participants who reported that they followed these three recommendations on 7 out of 7 days (i.e., those who scored 21).

Non-adherence to medications: participants who reported that they didn't follow these three recommendations at any time during the 7 days (i.e., those who scored 0–20).

Physical activity: Physical activity was assessed by two items. 1. How many of the past seven days did you perform at least 30 minutes of total physical activity? 2. How many of the past seven days did you perform specific exercise activities (swimming, walking, or biking) other than what you did around the house or as part of the work?.⁴¹

Adherence to physical activity: Participants who responded four days or more for each of two items or had a total score of 8 were considered physically active.⁴¹

Smoking: Smoking status was determined by one question: “how many cigarettes or cigars

did you smoke in the last seven days, even if it was just one puff?” Respondents who reported zero days of smoking were classified as nonsmokers. Everyone else was classified as a smoker.⁴¹

Salt intake: The H-SCALE has twelve items used to assess practices related to adherence to a low-salt diet in the preceding 7 days. The items were modified to nine, as items 3, 7, and 11 are country-specific. Six items were negatively phrased, and the responses for these items were reverse coded (responses were 0–7 days). Then, a mean score was calculated. A score of 6 or higher indicated that the participants followed a low-salt diet for 6 out of 7 days and were considered salt restricted adherents.⁴¹

Alcohol: Participants who reported not drinking any alcohol (tella, tej, katikalla, beer, and others) in the last 7 days or who reported not drinking at all were considered abstainers. All others were regarded as non-adherent.⁴¹

Weight management - Ten items were used to assess weight management activities undertaken in the previous 30 days through dietary practices and physical activity. The response options ranged from strongly disagree (score = 1) to strongly agree (score = 5). Participants who agreed or strongly agreed with all ten items (score >40) were classified as practicing good weight management habits (weight management adherent).⁴¹

Overweight and obesity: BMI was calculated and classified according to WHO guidelines. Participants were classified as underweight if their BMI was < 18.5 kg/m², overweight if their BMI was 25.0–29.99 kg/m², and obese if their BMI was >30 kg/m².²⁸

Khat chewing was assessed with yes or no question and those who responded yes were considered khat user.⁶

Social support was measured using Oslo Social Support Scale (OSSS-3) which contains three items. The first item was rated on a 4-point Likert-type scale ranging from 1 to 4. The second and the third items were rated on a 5-point Likert-type scale ranging from 1 to 5. The sum score ranges from 3 to 14. The ranges from 12 to 14 in OSSS-3 were considered as strong social support, 9 to 11 were considered as moderate social support, and 3 to 8 were poor social support.²⁸

4.9.Data quality management

Before data collection the English questionnaire was translated into the local language, Amharic, and then back into English to ensure consistency. Before data collection, the questionnaire was pretested on 5% of the total sample at Ras Desta Damtew Hospital to determine the response rate, clarity, sequence, and consistency of the questionnaire. The sequence of the tool was adjusted based on the results of the pretest. An inter-rater reliability test was performed for nurses who were collecting the data using pilot testing, training, and standardization. The data collectors were given two days of training on the study's objective, relevance, and confidentiality of information, respondents' rights, informed consent, and interview techniques. In addition, a practical interview demonstration was held in a classroom.

During data collection, the data collection and interviewing mechanism was strictly supervised throughout the data collection period by the assigned supervisors and the principal investigator. The questionnaires were checked for completeness and consistency at the site of the data collection by the principal investigator.

During data entry and analysis, the collected data were coded and entered into EpiInfo 7. The quality of the data was controlled through skipping patterns that must enter and reduce transportation errors in EpiInfo 7. Finally, cleaning and analysis were performed using SPSS version 25.

4.9. Data Management and Data Analysis Procedures

After checking for its completeness, the data was entered into Epiinfo 7 and then exported to SPSS version 25 for data analysis. Descriptive statistics were computed and summarized in tables and graphs with frequencies, percentages, means, or standard deviations where appropriate. In bivariable analysis, variables that had significant associations with the dependent variables and a p-value of less than 0.2 were entered into the multivariable analysis model. The multivariable analysis model, using the B coefficient and adjusted odds ratio (AOR), was applied to identify associated factors for the dependent variables, and a level of significance below 0.05 was considered to determine the association between dependent and independent variables. The strength of the association between factors and the dependent variables was determined using AOR with a 95% confidence level (CI).

4.10. Ethical Consideration

Ethical clearance was obtained from the St. Paul's Hospital Millennium Medical College academic and Research Ethical Committee. Before interviewing participants, the purpose of the study was explained in plain language until it was well understood, and informed consent was obtained. During data collection, the study participants were informed that the information collected would be kept confidential.

4.11. Dissemination of Results

The findings of this study will be submitted to the Department of Family Medicine, Saint Paul's Hospital Millennium Medical College in Partial Fulfillment of the Requirements for Specialty Certificate in Family Medicine. The outcome of this study will be presented and disseminated to other concerned stakeholders through presentations in different professional forums. Finally, the manuscript will be submitted to a reputable peer-reviewed journal for possible publication.

5. Results

5.1. Socio-demographic Characteristics

A total of 600 patients participated in the study, yielding a response rate of 94.8%. Over half (55.3%) of the respondents were female. The average age of the participants was 58.32 years (± 12.41). More than half (66.5%) were under 60 years of age. The majority of respondents (80.5%) were married. Regarding education, 102(17.0%) had no formal education, while 345(57.5%) had completed college or higher education. The majority of respondents (86.2%) have monthly income of greater than 1000ETB (**Table 1**).

Table 1. Socio-demographic characteristics of adult hypertensive patients on follow-up in public hospitals of Addis Ababa, Ethiopia, 2025(n = 600).

Variable	Category	Frequency (%)
Sex	Female	332(55.3)
	Male	268(44.7)
Age category	<60	399(66.5)
	>60	201(33.5)
Marital status	Married	483(80.5)
	Single	73(12.2)
	Divorced	25(4.16)
	Widowed	19(3.2)
Educational status	No formal education	102(17.0)
	Primary	84(14.0)
	Secondary	69(11.5)
	College and above	345(57.5)
Occupational status	Housewife	240(40.0)

	Government employee	153(25.5)
	Unemployed	63(10.5)
	Retired	82(13.7)
	Private business	50(8.3)
	Other*	12(2.0)
Income category		
	<500ETB	43(7.2)
	501-1000ETB	40(6.7)
	>1000ETB	517(86.2)

*Others: students, daily labourers

5.2. Clinical Characteristics of the Respondents

Nearly half of the respondents (46.0%) were underweight, followed by 41.5% who were overweight. The mean BMI was 27.02 ($\pm$ 4.14) kg/m². The mean weight was 79.4 ($\pm$ 12.46) kilograms, and the mean height was 1.74 ($\pm$ 0.08) meters (**Table 2**).

Table 2. Clinical characteristics of adult hypertensive patients on follow-up in public hospitals of Addis Ababa, Ethiopia, 2025 (n = 600).

Variable	Category	Frequency (%)
BMI	Underweight	276(46.0)
	Normal weight	24(4.0)
	Overweight	249(41.5)
	Obese	51(8.5)
Number of hypertensives medications	$\leq$ 2 medication	485(80.8)
	Three or more	115(19.2)
	<5 years	408(68.0)

Duration of hypertension diagnosis		
	5-10 years	173(28.8)
	>10 years	19(3.2)
Family history of hypertension	Yes	326(54.3)
	No	274(45.7)
Comorbidity status	Yes	422(70.3)
	No	178(29.7)

5.3. Behavioural Practices of the Respondents

Around 42.7% of the respondents did not adhere to their antihypertensive medication regimen (e.g., missing doses, taking medications at incorrect times, or incorrect dosages). The majority (55.7%) did not engage in regular or prescribed physical activity. Although, more than three-quarters (77.3%) of the respondents follow the recommended low-salt or DASH diets (Table 3).

Table 3. Behavioural practice-related variables of adult hypertensive patients on follow-up in public hospitals of Addis Ababa, Ethiopia, 2025 (n = 600).

Variable	Category	Frequency (%)
Khat chewing	Yes	28(4.7)
	No	572(95.3)
Smoking status	Yes	32(5.3)
	No	568(94.7)
Alcohol drinking	Yes	52(8.7)
	No	548(91.3)
Medication adherence	Adhere	344(57.3)
	Not adhere	256(42.7)

Physical exercise adherence	Adhere	266(44.3)
	Not adhere	334(55.7)
Low salt diet	Adhere	464(77.3)
	Not adhere	136(22.7)
Weight management practices	Adhere	196(32.7)
	Not adhere	404(67.3)

5.4. Prevalence of Uncontrolled Hypertension

The prevalence of uncontrolled hypertension among adult hypertensive patients in public hospitals of Addis Ababa was 58.3% (95% CI = 54.34%, 61.6%). The mean systolic blood pressure (SBP) from three consecutive measurements was 156.24 ($\pm$ 16.4) mmHg, with a maximum of 198.6 mmHg and a minimum of 108.3 mmHg. The average diastolic blood pressure (DBP) from the same three measurements was 76.4 ($\pm$ 9.27) mmHg, with a maximum of 103 mmHg and a minimum of 74.67 mmHg (Fig 2).

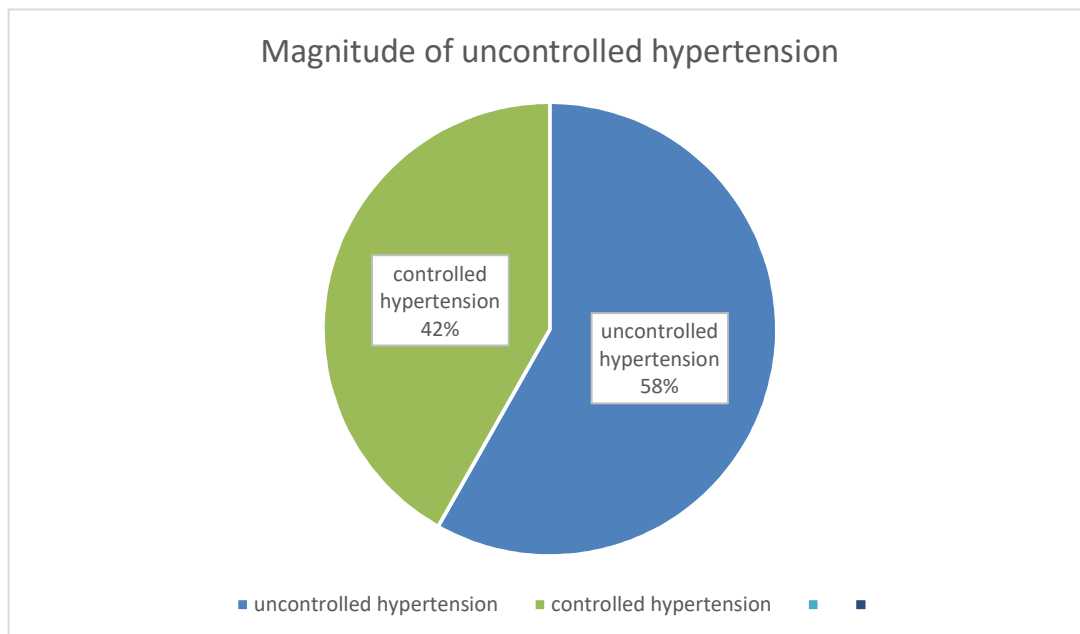


Figure 2. Magnitude of uncontrolled hypertension among adult hypertensive patients on follow-up in public hospitals of Addis Ababa, Ethiopia, 2025 (n = 600).

5.5. Factors associated with uncontrolled hypertension

After adjusting for various factors, the analysis revealed that several factors were associated with uncontrolled hypertension. These include the presence of comorbidities, overweight status, non-adherence to antihypertensive medications and use of three or more antihypertensive medications.

Patients with one or more co-morbid conditions had 2.38 times the odds of developing uncontrolled hypertension compared to those without comorbidity (AOR = 2.38, 95% CI: 1.34, 4.96). Overweight hypertensive patients were 2.52 times more likely to experience uncontrolled hypertension than those of normal weight (AOR = 2.52, 95% CI: 1.96, 6.24).

Those who did not adhere to their anti-hypertensive medications were 6.31 times more likely to have uncontrolled hypertension compared to those who adhered to their medication regimen (AOR = 6.31, 95% CI: 3.76, 9.44). Patients taking three or more anti-hypertensive medications had 2.21 times the odds of developing uncontrolled hypertension compared to those using one or two medications (AOR = 2.21, 95% CI: 1.21, 7.63) (**Table 4**).

Table 4. Bivariate and multivariate logistic regression to identify factors associated with uncontrolled hypertension among adult hypertensive patients on follow-up in public hospitals of Addis Ababa, Ethiopia, 205(n = 600).

Variable	Category	Uncontrolled hypertension		COR (95% CI)	p-value	AOR (95% CI)	p-value
		Yes (%)	No (%)				
Sex	Male	200(33.3)	68(11.3)	1.67(0.85, 2.78)	0.094	1.67 (0.87, 2.45)	0.889
	Female	212(35.3)	120 (20.0)	1		1	
Comorbidity	Yes	280(46.7)	142 (23.7)	0.9 (2.45, 5.88)	<0.001	2.38(1.34, 4.96)	0.006
	No	122(20.3)	56(9.3)	1		1	
Khat chewing	Yes	20 (33.3)	8(1.3)	1.38(0.83, 11.44)	0.086	2.69 (0.70, 8.97)	0.634
	No	369(61.5)	203 (33.8)	1		1	
Age category	<60 years	227(37.8)	172 (28.7)	1		1	
	>60 years	133 (22.2)	68 (11.3)	0.67(2.06, 6.00)	<0.001	2.88 (1.37, 6.04)	0.781
Educational status	No formal education	86 (14.3)	16 (2.67)	1.57(1.78, 6.41)	<0.001	0.67 (0.45, 2.66)	0.862
	Primary	55(9.17)	29 (9.1)	1.80(0.94, 2.82)	0.075	0.77(0.38, 1.63)	0.432
	Secondary	36 (6.0)	33 (5.5)	3.14(1.72, 4.56)	0.045	1.45(0.27, 4.65)	0.355
	College and above	267 (44.5)	78(13.0)	1		1	
BMI category	Normal weight	16 (2.7)	8(1.3)	1		1	
	Overweight	141(23.5)	108 (18.0)	1.53(2.60, 8.45)	0.004	2.52(1.96, 6.24)	0.018
	Obese	34 (5.7)	17 (2.83)	3.41 (1.76, 5.09)	0.034	1.65(0.76, 4.55)	0.230
	Underweight	247(41.2)	29 (4.8)	0.23(0.21, 3.89)	0.893	2.66 (0.63, 12.34)	0.567
Medication adherence	Yes	234(39.0)	110 (18.3)	1		1	
	No	163(27.17)	93 (15.5)	1.21(3.77, 9.76)	<0.001	6.31 (3.76, 9.44)	0.001
Low-salt diet	Yes	402 (67.0)	62 (10.3)	1		1	

adherence	No	104(17.3)	32(5.3)	2.0(1.56, 2.88)	0.040	2.47(1.23, 6.47)	0.176
Weight management	Yes	126 (21.0)	70 (11.7)	1		1	
	No	224(37.3)	180(30.0)	1.5(1.23, 2.77)	0.042	2.45 (0.66, 4.22)	0.045
Number of anti-hypertensives	≤ two	269 (44.8)	216(36.0)	1		1	
	≥ three	76(12.7)	39 (6.5)	1.56 (2.58, 11.09)	0.001	2.21(1.21, 7.63)	0.031
Physical exercise	Adhere	117 (19.5)	149 (24.8)	1		1	
	Not adhere	225(37.5)	109(18.2)	2.63(4.42, 6.18)	0.001	2.44(1.69, 4.39)	0.118

6. Discussion

6.1. Discussion

The findings from this study highlight a significant issue regarding the management of hypertension, with nearly two-thirds of hypertensive patients on antihypertensive treatment experiencing uncontrolled hypertension. This suggests a serious gap in the effective control of blood pressure in individuals receiving treatment, which could lead to an increased risk of cardiovascular diseases and other related complications. Factors such as the presence of comorbidities, being overweight, non-adherence to prescribed antihypertensive medications, and the use of three or more antihypertensive medications were identified as key contributors to uncontrolled hypertension.

Approximately two-thirds of hypertensive patients undergoing antihypertensive treatment had uncontrolled hypertension. This prevalence aligns with findings from studies conducted in six Latin American countries (Argentina, Brazil, Chile, Colombia, Peru, and Uruguay) with a rate of 62.4%,⁴⁴ the Islamic Republic of Iran at 68.5%,⁴⁵ India at 68.3%,⁴⁶ the Republic of Congo at 66%,⁴⁷ Addis Ababa Health Centers at 69%,⁴⁸ and Addis Ababa public hospitals at 66.2%,⁷ which also reported a high prevalence of uncontrolled hypertension. But our study differs from the study done in Addis Ababa Health Centers⁴⁹ in that most of the patients were in monotherapy; methyldopa being the most commonly used, and the study is done in a health center level so the level of care is different. Although the study done in Addis Ababa public hospitals⁷ is in similar setting like this study it differs in that most were >60 years of age and the proportion of participants who were normal weight and obese is much higher than this study.

On the other hand, other studies in Ethiopia have reported relatively lower rates of uncontrolled hypertension. For instance, a study conducted at Mekelle, northern Ethiopia, found a prevalence of uncontrolled hypertension of 48.6%.⁴⁹ This is also lower than the prevalence of 58.3% observed in our study, further reinforcing the possibility of regional variation. The relatively lower prevalence in Mekelle could be due to one the participants have lower proportion of medication non adherence compared to this study. Another is the different healthcare delivery models or socioeconomic factors influencing the population's ability to access care and adhere to treatment regimens.

Furthermore, a study conducted in Gonder, which is also located in northern Ethiopia, found a prevalence of 37% for uncontrolled hypertension among hypertensive patients.⁵⁰ Again, this is lower than the study's prevalence, and like the Mekelle study,⁵⁰ it could be due to differences in patient characteristics, nutrition, community-based healthcare systems in northern Ethiopia. In contrast, patients in Addis Ababa and other major cities might face different challenges, including overcrowded health facilities, longer waiting times, urbanization, processed foods and sedentary lifestyle, which could hinder effective blood pressure control.

In this study, hypertensive patients with comorbidities were found to be 2.38 times more likely to experience uncontrolled hypertension compared to those without comorbid conditions. This observation aligns with findings from research conducted at Ayder Comprehensive Specialized Hospital.²¹ One plausible explanation for this association is that several chronic diseases can complicating the management of blood pressure. The concurrent treatment of multiple conditions may hinder effective hypertension control, as managing these comorbidities can interfere with the optimal regulation of blood pressure.⁵⁴

In this study, overweight hypertensive patients were 2.52 times more likely to have uncontrolled hypertension compared to those with a normal weight. This finding aligns with research from the Republic of Congo,⁵¹ Ayder Comprehensive Specialized Hospital,²¹ and Jimma University study.²⁰ The underlying explanation could be that excess weight increases afterload and peripheral vascular resistance, contributing to higher triglyceride and cholesterol levels, lower high-density lipoprotein (HDL) levels, and ultimately, poorly controlled hypertension.²⁹

Medication adherence plays a pivotal role in the effective management of hypertension. In this study, 42.7% of hypertensive patients were not adhering to their prescribed antihypertensive medications. This rate is notably higher than findings from the mekelle study (26.4%),⁵² A potential explanation for this high rate of non-adherence may be the burden of taking multiple medications and in this study up to 19% of patients are taking three or more antihypertensive medications in addition 70.3% of patients have comorbidities for which they also take medication adding to the pill burden, which can lead to pill fatigue, a greater risk of side effects, and concerns about the costs involved.²⁸ Furthermore, factors such as low motivation, the perception of treatment ineffectiveness, inadequate

communication between patients and healthcare providers, and higher out-of-pocket expenses may contribute to this non-adherence.⁵³ Additional reasons might include the presence of comorbidities, sociocultural barriers, financial constraints, and the complexity of the medication regimen itself.⁵⁴ The observed medication adherence rate in this study aligns with findings from major global cities, including studies in Kenya (43.7%),⁵⁵ Riyadh, Saudi Arabia (59.1%),⁵⁶ Asmara, Eritrea (72.0%).⁵⁷

This study also found that hypertensive patients taking three or more antihypertensive medications were 2.21 times more likely to have uncontrolled hypertension compared to those taking one or two antihypertensive medications. This result aligns with findings from nationwide studies in Thailand,⁵⁸ Ghana,⁵⁹ and Ayder Comprehensive Specialized Hospital.⁶⁰ This consistency may be explained by the fact that patients requiring three or more medications likely struggle to manage their blood pressure with just one or two drugs, and even with multiple medications, their hypertension remains poorly controlled.

6.2. Strength and Limitations of the Study

The strength of this study is it used primary data. But it has several limitations. Social desirability bias may have affected self-reported behaviours such as smoking, alcohol consumption, and Khat chewing, with participants potentially underreporting these activities. Since most of the H-SCALE questions were self-reported, responses may have been influenced by the desire to present themselves favourably. Recall bias is another limitation, as participants' responses were based on memory, which could lead to inaccuracies. Additionally, the cross-sectional study design limits the ability to establish causal relationships, and the short study duration may also affect the findings.

6.3. Conclusion

This study highlights the high prevalence of uncontrolled hypertension, with several factors such as medication adherence, comorbidities, overweight status, and using more than two antihypertensive medications contributing to poor blood pressure control.

6.4. Recommendation

Given the limitations such as potential social desirability and recall bias, as well as the cross-sectional design, future studies should employ more robust methodologies, including

longitudinal designs and objective measurements, to establish causal relationships. It is recommended that healthcare providers focus on improving medication adherence, address comorbid conditions, and offer personalized interventions to manage the complexities of hypertension, especially for those on multiple medications. Enhanced patient education and improved access to healthcare could also help mitigate these challenges.

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Annex

Annex I: Information form

This information form is prepared for patients who are on follow up treatment at OPD at Tirunesh Beijing General Hospital or Ras Desta Damtew Hospital or Yekatit 12 Hospital in Addis Ababa who will be participating in the study. The study aims to assess the burden of Uncontrolled Hypertension and its associated factors.

Name of the principal investigator: Dr. Derese Gizaw

Name of the organization: Tirunesh Beijing General Hospital or Ras Desta Damtew Hospital or Yekatit 12 Hospital.

Name of the sponsor: St. Paul's Hospital millennium medical college

This information form is prepared to explain the study you are being asked to join. Please listen carefully and ask any questions about the study before you agree to join. You may ask a question at any time after joining the study. The investigator is final year family medicine resident student from St. Paul's Hospital millennium medical college.

Purpose of the research project: I am hopeful that this research will contribute to identifying the level of Uncontrolled Hypertension and its associated factors in public hospitals, in Addis Ababa.

Procedure: If you are willing to participate in this project you need to understand and tick yes agreement form, then after you will be filling investigator-administered questionnaire. Your response will be kept confidential and no one will have access to your response.

Risk/discomfort: By participating in this research project you may feel that it has some discomfort especially on wasting time about 30 minutes. I hope you will participate in the study for the sake of the benefit of the research result. There is no risk in participating in this research project.

Benefits: the information that you are going to give will help to know the burden of Uncontrolled Hypertension and its associated factors in Addis Ababa.

Incentives/payment for participating: there is no incentive or payment to be gained by taking part in this research.

Annex II: consent form

Burden of Uncontrolled Hypertension and its associated factors in Addis Ababa, Ethiopia

The researcher is a resident at St. Paul's Hospital Millennium Medical College and I am conducting a research with the title given above. As part of my research processes I have prepared a set of question to be answered by voluntary patients, which are meant only to achieve the study objective. I am requesting you to respond honestly for interview questions. By this I declare that the identity of any participant will be through randomly set code name and will not be disclosed under any circumstance. The questionnaires take only 20-25 minutes to answer. Your participation is voluntary and you are kindly requested to answer every question and you may stop at any time you want. So I need your genuine cooperation. If you need any clarification, do not hesitate to ask.

Would you be willing to participate?

If yes, proceed to answer the questions

If no pass to the next participant

Annex III: Questionnaire in English language

General Information										
Code No										
Name of health facility		1. TBGH 2.RDDH 3. Y12HMC								
Name of data collector										
Date of data collection										
Part I. Socio-demographic Characteristics of the patients										
Part II. Hypertension—Self-care Activity Level Effects (H-SCALE) Items										
201	Medication usage: How many of the past 7 days did you:									
101	I. Patient ID/ID number									
	I. Take your blood pressure pills? _____		0	1	2	3	4	5	6	7
102	II. Take your blood pressure pills at the same time every day? _____		0	1	2	3	4	5	6	7
103	III. Take the recommended number of blood pressure pills? _____		0	1	2	3	4	5	6	7
202	Diet									
	How many of the past 7 days did you:									
			3.Divorced 4.Widowed							
106	Occupation		1. Farmer 2. Civil servant 3. Merchant 4. Housewife 5. Other specify_____							
107	Current educational level		1. No formal education 2. Primary education (1–8 grade) 3. Secondary education (9–12 grade) 4. College and above							
108	Monthly income		_____ETB							

	Follow a healthy eating plan?	0	1	2	3	4	5	6	7
	Eat potato chips, salted nuts, or salted popcorn?	0	1	2	3	4	5	6	7
	Eat pickles, olives, or other vegetables in brine?	0	1	2	3	4	5	6	7
	Eat ≥ 5 servings of fruits and vegetables?	0	1	2	3	4	5	6	7
	Eat store-bought or packaged bakery goods?	0	1	2	3	4	5	6	7
	Salt your food at the table?	0	1	2	3	4	5	6	7
	Add salt to food when you're cooking?	0	1	2	3	4	5	6	7
	Eat fried foods such as chicken, french fries, or fish?	0	1	2	3	4	5	6	7
	Avoid eating fatty foods?	0	1	2	3	4	5	6	7
203	Smoking: How many of the past 7 days did you								
	I. Smoke a cigarette or cigar, even just one puff?	0	1	2	3	4	5	6	7
204	Physical Activity: How many of the past 7 days did you								
	I. Do at least 30 minutes total of physical activity?	0	1	2	3	4	5	6	7
	II. Do a specific exercise activity (such as swimming, walking, or biking) other than what you do around the house or as part of your work?	0	1	2	3	4	5	6	7
205	Alcohol: How many of the past 7 days did you								
	I. Do you drink alcohol?	0	1	2	3	4	5	6	7
	II. On a typical day that you drink alcohol, how many drinks do you have	0	1	2	3	4	5	6	7
	III. What is the largest number of drinks that you've had on any given day within the last month	0	1	2	3	4	5	6	7
206	Weight Management: In order to lose weight or maintain my weight		Strongly Disagree		Neutral		Agree		Strongly Agree
	I. I am careful about what I eat.	1		2	3		4	5	
	II. I read food labels when I grocery shop.	1		2	3		4	5	
	III. I exercise in order to lose or maintain weight.	1		2	3		4	5	
	IV. I have cut out drinking sugary sodas and sweet tea.	1		2	3		4	5	
	V. I eat smaller portions or eat fewer portions.	1		2	3		4	5	
	VI. I have stopped buying or bringing unhealthy foods into my home.	1		2	3		4	5	
	VII. I have cut out or limit some foods that I like but that are not	1		2	3		4	5	

	good for me.					
	VIII. I eat at restaurants or fast food places less often.	1	2	3	4	5
	IX. I substitute healthier foods for things that I used to eat.	1	2	3	4	5
	X. I have modified my recipes when I cook.	1	2	3	4	5
Part III. Questionnaire related Social support						
301	How many people are so close to you that you can count on them if you have great personal problems?	1. None	2. 1-2	3. 3-5	4. 5+	
302	How much interest and concern do people show in what you do?	1. None	2. little	3. Uncertain	4. Some	5. A lot
303	How easy is it to get practical help from neighbors if you should need it?	1. Very difficult	2. Difficult	3. Possible	4. Easy	5. very easy
Part IV. Clinical values						
Part IV.I.						
401	Frequency of appointment (months)	1. Every 1 month 2. Every 2 months 3. Every 3 months				
402	Blood pressure check-up (months)	1. >2 times 2. ☐ 2 times				
403	Source medication coverage	Health insurance, Self-sponsored, Free charge				
404	Number medication used	Mono-therapy Dual therapy ☐ Triple therapy				
405	Family history of HTN	Yes 1. No				
406	Duration of treatment	_____ year				
407	Duration of HTN	_____ year				

408	Comorbidity	Yes 2. No
409	Types of comorbidities	Diabetes mellitus Chronic kidney disease Myocardial infarction Stroke Dyslipidemia Others.....
410	Khat chewing	1. Yes 2. No
Part IV.II to be filled by the examiner		
411	Blood pressure (BP)	SBP_____mm/hg DBP_____mm/hg SBP_____mm/hg DBP_____mm/hg SBP_____mm/hg DBP_____mm/hg
412	BMI _____	1.Weight_____Kg 2. Height_____Mt

	ጤና ማዋዋል መጋገጥ ብዕቅድ ይከተላል?	0	1	2	3	4	5	6	7
	የድንች ችግር ፡ ጨዋታ ለወላጅ ወይም ለሌላ ልጅ ይበላሉ?	0	1	2	3	4	5	6	7
	በጤና ማወሃ ውስጥ የተዘፈነ አትክልቶችን ይበላሉ?	0	1	2	3	4	5	6	7
	≥5 ፍራፍሬና አትክልት ይበላሉ?	0	1	2	3	4	5	6	7
	በሱቅ የተገዙ ወይም የታሸጉ የዳቦ ምርቶችን ይበላሉ?	0	1	2	3	4	5	6	7
	ከቀረበ በኋላ በምግብም ላይ ጨው ይጨምራሉ?	0	1	2	3	4	5	6	7
	ምግብ በሚያበስሉበት ጊዜ ጨው ይጨምራሉ?	0	1	2	3	4	5	6	7
	በዘይት የተጠበሱ እንደ ዶሮ ችግር ወይም አሳ ያሉ ምግቦችን ይመግባሉ?	0	1	2	3	4	5	6	7
	የሰባ ምግቦችን ከመመገብ ይቆጠባሉ?	0	1	2	3	4	5	6	7
203	ሲፖራ ማጫካ ፡ ባለፉት 7 ቀናት ውስጥ ምን ያህሉን አደረጉ ፡ -								
	I. ሲፖራ አጭጭ ውቃት?	0	1	2	3	4	5	6	7
204	አካላዊ እንቅስቃሴ ፡ ባለፉት 7 ቀናት ውስጥ ምን ያህል ሰርተዋል ፡ -								
	I. ቢያንስ ለ 30 ደቂቃዎች አጠቃላይ የአካል ብቃት እንቅስቃሴ አድርገዋል?	0	1	2	3	4	5	6	7
	II. በቤት ውስጥ ከምትሠራው ወይም እንደ ሥራህ አካል ካልሆነ የተለየ የአካል ብቃት እንቅስቃሴ (እንደ ዋና ፡ የእግር ጉዞ ወይም ብስክሌት) አድርገዋል?	0	1	2	3	4	5	6	7
205	አልኮል ፡ ባለፉት 7 ቀናት ውስጥ ምን ያህል ፡ -								
	I. አልኮል ጠጥተዋል?	0	1	2	3	4	5	6	7
	II. አልኮል በሚጠጡበት የተለመደ ቀን ፡ ምን ያህል መጠጦች ይጠጣሉ?	0	1	2	3	4	5	6	7
	III. ባለፈው ወር ውስጥ በማንኛውም ቀን ከጠጡ ከፍተኛው መጠጥ ብዛት ምን ያህል ነው?	0	1	2	3	4	5	6	7
206	የክብደት አመጣጥ ፡ ክብደትን ለመቀነስ ወይም ክብደቱን ለመጠበቅ ፡ -								
	I. ስለምባለው ነገር እጠነቃቃለሁ።	1	2	3	4	5			
	II. ግሮሰሪ ስገባ የምግብ መለያዎችን አነባለሁ።	1	2	3	4	5			
	III. ክብደትን ለመቀነስ ወይም ለማቆየት የአካል ብቃት እንቅስቃሴ አደርጋለሁ።	1	2	3	4	5			
	IV. ስኪር የበዛበት መጠጦች እና ጣፋጭ ምግቦች አቁሟልሁ።	1	2	3	4	5			
	V. ትንሽ እበላለሁ ወይም ጥቂት እበላለሁ።	1	2	3	4	5			
	VI. ጤና ማያልሆኑ ምግቦችን ወደ ቤቴ መግዛትም ሆነ ማምጣት አቁሟልሁ።	1	2	3	4	5			
	VII. አንዳንድ የምወዳቸውን ነገር ግን ለኔ የማይጠቅሙ ምግቦችን አቁሟልሁ።	1	2	3	4	5			

	VIII በሬስቶራንቶች ወይም በፈጣን ምግብ ቦታዎች በብዛቸው አልመገብም።	1	2	3	4	5
	IX. ጤናማ ምግቦችን በምመገብ ብባቸው ነገሮች ለውጫሉ።	1	2	3	4	5
	X. ምግብ በማዘጋጅ በትጊዜ የምግብ አዘገጃጀቶችን አሻሽያለሁ።	1	2	3	4	5
ክፍል III. ስለ ማህበራዊ ድጋፍ መጠይቅ						
301	ምን ያህል ሰዎች ከእርስዎ ጋር በጣም ቅርብ ስለሆኑ ታላቅ የግል ችግሮች ካጋጠመዎት በእነሱ ላይ መተማመን ይችላሉ?	1. የለም	2. 1-2	3. 3-5	4. 5+	
302	ሰዎች በምታደርገው ነገር ምን ያህል ፍላጎት እና አሳቢነት ያሳያሉ?	1. የለም	2. ትንሽ	3. እርግጠኛ ያልሆነ	4. አንዳንዶች	5. ብዙ
303	ከፈለጉ ከጎረቤቶች ተግባራዊ እርዳታ ማግኘት ምን ያህል ቀላል ነው?	1. በጣም አስቸጋሪ	2. አስቸጋሪ	3. ይቻላል	4. ቀላል	5. በጣም ቀላል
ክፍል IV. ከላቦራቶሪ እና ከህክምና ጋር የተያያዙ እሴቶች						
IV.I						
401	የቀጠሮ ድግግሞሽ	1. በየ 1 ወር 2. በየ 2 ወሩ 3. በየ 3 ወሩ				
402	የደምግፊት ምርመራ (በወር)	1. >2 ጊዜ 2. ≤2 ጊዜ				
403	የመድኃኒት ወጪ ሽፋን ምን ጭማቂ	የጤና መድን፣ የራስ ክፍያ፣ ነፃ ክፍያ				
404	ጥቅም ላይ የዋሉ መድኃኒቶች ብዛት	አንድ አይነት ሁለት አይነት ሶስት አይነት				
405	የደምግፊት የቤተሰብ ታሪክ	አለ 2. ይለም				
406	የሕክምና ውቅያኖስ	_____ አመት				
407	የደምግፊት ቅድመ	_____ አመት				
408	ተጋዳሚ በሽታ አለ?	አዎ 2. አይደለም				
409	የተጋዳሚ በሽታ ዓይነት	የስኳር በሽታ ሥር የሰደደ የኩላሊት በሽታ				

		የ ልብ ድካም ስትሮክ የ ኮሌስትሮል መዝገብ ሌሎች
410	ጭነት መቃኘት	1. አዎ 2. አይ
IV.II. ጥያቄውን በሚጠይቀው ሰው የሚከተለው		
411	Blood pressure (BP)	SBP_____mmHg , DBP_____mmHg SBP_____mmHg , DBP_____mmHg SBP_____mmHg , DBP_____mmHg
412	BMI _____	1.Weight_____Kg 2. Height_____Mt